

Now the suggestion I would venture to make is, that the phenomenon may be attributed to all and each of the forces above mentioned; and that the discrepancy of opinion between so many experienced and trustworthy observers may arise from their researches having been conducted at different seasons of the year, in different states of temperature, on different soils or kinds of rock (some of which retain or impart more heat than others), at different heights above the sea-level, after the fall of a greater or less quantity of glacier snow, at different degrees of solar heat or radiation, or under many other different conditions. Some of the theories are self-evident, and have been admitted to a certain extent by their opponents. Perhaps the structure of the material in various climates and at different heights may be better known when the science of photography has been further applied to it, as I cannot help thinking that the interesting and kaleidoscopic forms of snow (taken by Mrs. Glaisher), which were exhibited at the last *soirée* given by the Assistant Secretary of the Royal Society, may throw some light on this vexed and difficult question.

It seems to me that the *modi operandi* of nature for the same purpose are various, and that the inanimate and animated creation are governed by similar or analogous laws. An illustration of this occurs to me in the case of certain marine mollusks and annelids which perforate limestone and other rocks. This operation has been attributed by naturalists to many and different causes: viz. to mechanical action, to a solvent power, to continual maceration of the material, as well as to the action of siliceous bodies which are occasionally found in some of these mollusks. The modern and better opinion, however, seems to be, that all or more than one of these various methods are used by the same species, and perhaps by the same animal, in effecting its object, according to the nature of the material acted on, the age of the individual, and other circumstances.

London, 13th July 1855.

BIBLIOGRAPHICAL NOTICES.

Catalogue of British Hymenoptera in the Collection of the British Museum. Part I. *Apidæ*—Bees. By FREDERICK SMITH, M.E.S.
London: Printed by Order of the Trustees, 1855. 12mo.

AMONGST the many anomalies presented by the state of Entomology in this country, the little attention paid to the interesting family of the Bees is certainly none of the least. It is indeed singular that the majority of our entomologists should confine themselves so religiously to the study of Coleoptera and Lepidoptera, the habits of which are

generally obscure and often wholly uninteresting, whilst the insects of the large order of Hymenoptera, which present so many points of interest in the almost infinite variety of their œconomy, attract scarcely anybody's attention. In the case of the Bees this is the more remarkable, as we have for many years possessed a work upon the British species of those insects (the 'Monographia Apum Angliæ' of Kirby, published in 1802), which has generally been regarded as a model of an Entomological monograph, and which, notwithstanding the lapse of more than half a century since its publication, still holds its place as a standard work.

Nevertheless even in this neglected department of Entomology, this interval of fifty years has added considerably to the list of British species, and shown that the learned author of the work above mentioned, was, as might be expected, not unfrequently in error with regard to the species known to him, and especially that in some cases he has placed together as males and females of the same species insects which are truly distinct, whilst in others the two sexes of the same insect have been described as distinct species. Most of these errors are now corrected, mainly by the exertions of Mr. Smith, whose numerous and interesting papers on British Bees, published in the 'Zoologist,' have done much for the extension of our knowledge of this subject. The scattered nature of these notices, however, renders the appearance of the present little work particularly welcome, as in it Mr. Smith has given in a systematic form the entire results of his study of the British Bees, pursued assiduously for more than twenty years, and in many instances with the advantage of having corrected his previous notions by the more extended intercourse with continental entomologists, which his present position at the British Museum has opened up to him.

Although brought out as one of the series of Catalogues published by the Trustees of the British Museum, this little book is certainly far more deserving of the title of a *monograph* than a great majority of the things that commonly make their appearance under that name, many of which indeed are little more than catalogues;—Mr. Smith's Catalogue contains full descriptions of all the genera and species, accompanied by observations on their habits and œconomy, which are rendered particularly valuable by the author's long experience, and will be found very interesting even to the general reader. Of this the following account of the œconomy of the Bees of the genus *Osmia* may serve as an example, and the reader will find many other passages of equal interest in other parts of the book:—

“If I were asked,” says Mr. Smith, “which genus of bees would afford the most abundant materials for an essay on the diversity of instinct, I should without hesitation point out the genus *Osmia*. I propose to notice in this place all that has occurred to me during an attentive observation of their œconomy for the last twenty years. The most abundant species is *Osmia bicornis*; its œconomy is varied by circumstances; in hilly country, or at the sea-side, it chooses the sunny side of cliffs or sandy banks, in which to form its burrows;

but in cultivated districts, particularly if the soil be clayey, it selects a decaying tree, preferring the stump of an old willow; it lays up a store of pollen and honey for the larvæ, which when full-grown spin a tough dark brown cocoon, in which they remain in the larva state until the autumn, when the majority change to pupæ, and soon arrive at their perfect condition; many however pass the winter in the larva state. In attempting to account for so remarkable a circumstance, all must be conjecture, but it is not of unfrequent occurrence; this species also frequently makes its burrows in the mortar of old walls. *Osmia leucomelana* may be observed availing itself of a most admirable, and almost ready, adaptation for a burrow; it selects the dead branches of the common bramble; with little labour the parent bee removes the pith, usually to the length of from five to six inches; at the end she deposits the requisite quantity of food, which she closes in with a substance resembling masticated leaves,—evidently vegetable matter; she usually forms five or six cells in one bramble-stick. The bee does not extract the whole of the pith, but alternately widens and contracts the diameter of the tube, each contraction marking the end of a cell; the egg is deposited on the food immediately before closing up the cell; it is white, oblong, and about the size and shape of a caraway-seed: the larva is hatched in about eight days, and feeds about ten or twelve, when it is full-grown; it then spins a thin silken covering, and remains in an inactive state until the following spring, when it undergoes its transformations, and appears usually in the month of June.

“*Osmia hirta* burrows in wood, seldom in any other material; the same habit will be observed in *Osmia cænea*; but I have observed this bee more than once constructing its burrow in the mortar of walls, and sometimes in hard sand-banks. *Osmia aurulenta* and *O. bicolor* are bees which commonly burrow in banks, the latter being very abundant in some situations, forming colonies; but although it appears to be the natural habit of these species to construct tunnels in hard banks, with great labour and untiring perseverance, still we find them at times exhibiting an amount of sagacity, and a degree of knowledge, that at once dispels the idea of their actions being the result of a mere blind instinct, impelling them in one undeviating course. A moment’s consideration will suffice to call to mind many tunnels and tubes ready-formed, which would appear to be admirably adapted for the purposes of the bee—for instance, the straws of a thatch, and many reeds; and what could be more admirably adapted to their requirements than the tubes of many shells? So thinks the bee! *O. aurulenta* and *O. bicolor* both select the shells of *Helix hortensis* and *H. nemoralis*: the shells of these snails are of course very abundant, and lie half hidden beneath grass, mosses, and plants; the bees finding them in such situations, dispense with their accustomed labour and take possession of the deserted shells. The number of cells varies according to the length of the whorl of the shell selected, the usual number being four, but in some instances they construct five or six, commencing at the end of the whorl; a suitable supply of pollen and honey is collected, an egg deposited, and a partition

formed of abraded vegetable matter; the process is repeated until the requisite number is formed, when the whole is most carefully protected by closing up the entrance with small pellets of clay, sticks and pebbles; these are firmly cemented together with some glutinous matter, and the bee has finished her task.

“We will now observe the intelligence of the bee under different circumstances: she has selected the adult shell of *Helix aspersa*; the whorl of this species is much larger in diameter than that of *H. nemoralis* or *H. hortensis*—too wide, in fact, for a single cell; our little architect, never at a loss, readily adapts it to her purpose by forming two cells side by side, and as she advances towards the entrance of the whorl, it becomes too wide even for this contrivance; here let us admire the ingenuity of the little creature; she constructs a couple of cells transversely! And this is the little animal which has been so blindly slandered as being a mere machine!

“There is still another species of this genus whose habits are so different to the rest, that our admiration of the ingenuity of these bees is greatly increased when we consider its curious details and reflect upon the degree of care and foresight exhibited by the provident parent,—this is the *Osmia parietina*, a bee only found in the northern parts of this country. This species selects the underside of a slate or stone lying on the ground, and having a hollow space beneath; to the stone the bee attaches the little balls of pollen. A stone of this kind was found at Glen Almond, Perthshire, on the Grampians, 800 feet above the level of the sea, by Mr. J. Robertson, who, on turning it up, observed a mass of cocoons; although he was not much acquainted with entomology, still he knew them to be the production of some insect; he presented the stone to the British Museum, and it was placed in my hands for observation. The size of the stone was 10 inches by 6; the number of cocoons attached to it two hundred and thirty: when first discovered, about one-third of them were empty; this was in the month of November. In the beginning of the following March, a few males made their appearance, and shortly afterwards some females; they continued to come forth occasionally until the end of June; at this time there remained thirty-five undeveloped cocoons; on opening one or two of them, they proved to contain active larvæ; these I carefully closed, and left the whole undisturbed until the following April, at which time, on examination, they proved to be still in the larva state; but at the end of May they changed to pupæ, and about the end of June began to come forth perfect insects. This, then, was the result—a portion of a deposit of eggs made in 1849 had been three years in arriving at maturity: when found, one-third were developed; the following year a second brood came forth, and whilst in my possession a third. In the first instance, the whole deposit was subject to the same influences, and had produced larvæ; what was the cause of the retarded development of the rest, it were vain to attempt to determine.”

There can be no doubt that this is one of the most valuable con-

tributions to entomological literature that has been brought out by the Trustees of the British Museum. It is illustrated with several excellent plates engraved on copper by the author himself, containing figures of all the genera, accompanied by carefully executed details. If we might suggest any improvement it would be, that Mr. Smith would have rendered his work more generally acceptable, had he given characters to the families and subfamilies into which he divides the Bees; for as it now stands, a beginner will perhaps be somewhat at a loss to determine which of the principal groups will receive a bee of which he may have taken specimens. This however is but a passing objection, and we trust that the present work, which is published at an exceedingly low price, may lead some of our young entomologists to turn their attention to the interesting subject of which it treats.

Proceedings of the Yorkshire Philosophical Society. Vol. I.
York, 1855.

We have recently received this interesting volume, containing "A selection from the papers relating to the Antiquities and Natural History of Yorkshire, read at the monthly Meetings of the Society, from 1847 to 1854," and recommend it strongly to the attention of our readers. By far the greater number of the papers here published relates to Antiquities, and are of such a character as doubtless to attract the attention of our Archæological brethren. Amongst those more especially interesting to the naturalist we may particularize the observations on *Zamia gigas*, by Messrs. Yates and Williamson; on the Zoophytes of the Flamborough Chalk, by Mr. Charlesworth; on the Sclerotic ring of the Eyes of Birds and Reptiles, by Mr. Allis; as well deserving of perusal.

PROCEEDINGS OF LEARNED SOCIETIES.

ZOOLOGICAL SOCIETY.

February 28, 1854.—Dr. Gray, Vice-President, in the Chair.

NOTICE OF THE SPECIES OF THE GENUS *ORTHOTOMUS* OF HORSFIELD, WITH DESCRIPTIONS OF A NEW SPECIES, AND OF THOSE HITHERTO KNOWN. BY FREDERIC MOORE, ASSIST. MUS. EAST INDIA COMPANY.

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